gress, and a general report on the work of the past year up to March 31.

The whole matter is another triumph of German organisation. Throughout the committees, which are interacting, are zoologists, ornithologists, botanists, geologists, and archæologists. The useful term "natural monument"—Alexander von Humboldt seems first to have employed it—includes practically everything indigenous which possesses scientific interest. In this report, for instance, which is well illustrated, there are accounts, not only of the *Porta Westfalica*, a human monument, but of interesting trees, "erratic" blocks of stone, moraines, diluvial sandstone formations, many characteristic specimens of the flora and fauna of the country, including various subdivisions, such as lichens and Lepidoptera. The term and the whole conception of the scheme are absolutely comprehensive. Many charts have already been prepared showing the local distribution of the "monuments"; such publications are of the highest scientific interest, especially when their subjects may still be counted on by the observer as existing in actuality.

It is to be hoped that this report may find its way to the hands of some English statesman. It gives an object-lesson of what can be done, and of how it may be done, to preserve the natural character of a country. In England the enclosure of sites and preservation of scenery too often result in the destruction of both fauna and flora. Where are the denizens, vegetable and animal, of White's Selborne? The present writer for many years had the privilege of research in a certain wild corner of Wensleydale which was as rich in rare plants and birds as any district in Great Britain. The ownership changed hands, and the whole of the wild life of the place was destroyed, first, by drainage for the purpose of making a coursing-ground, and later by operations connected with the water-supply of a great manufacturing town. This was vandalism no less brutal than the destruction of an exquisite statue.

It would be a profound satisfaction to lovers of nature if our country could be preserved in an efficient and comprehensive way. It is a work that could well be initiated by the Board of Agriculture. Dr. Conwentz, by the publication last year in English of his book "The Care of Natural Monuments, with Special Reference to Great Britain and Germany," has already given us a guide to both principle and execution. The present report—which can be read at one sitting—justifies his guidance.

A. E. CRAWLEY.

THE MIGRATIONS OF PLAICE.[1]

THE marking of plaice was commenced on the east coast of Ireland in August, 1905, and in a recent report Mr. G. P. Farran deals with such recaptures as have been made up to the end of 1907.

The principal plaice grounds on the coast of Ireland considered are within the areas prohibited to steam trawling, and the recaptures have been chiefly made by the local sailing trawlers and by line fishermen. In these circumstances it seems possible that here, as in other "prohibited" areas, some cases of recapture by steam trawlers may, for obvious reasons, be suppressed by the fishermen concerned.

Omitting certain fish liberated under unfavourable conditions, the total proportion of recaptured marked plaice stands at 46 per cent., from which Mr. Farran concludes that the local fishermen remove no inconsiderable portion of the stock of plaice on their fishing grounds. As an instance of how heavily a small area can be fished may be noted an experiment made in Skerries Bay. One hundred and eighty plaice were marked in April, 1906, out of which number no fewer than one hundred and nineteen, or 66 per cent., had been reported before the end of 1907.

In contrast to the long migrations which have been observed in the North Sea and at Iceland, very little tendency to extensive wanderings is shown by the plaice in these experiments. The majority were retaken within ten miles of the position of liberation. It is interesting to note that an inshore movement in the Dublin Bay area was evident in the autumn. A similar tendency has been noticed at this time of the year in some other parts of the British Isles, and is a well-known feature of the small plaice grounds off the Danish coast.

The choice of a suitable label for these experiments seems to have presented some difficulty. The German pattern of Dr. Heincke was found satisfactory for the size of fish most frequently met with, but unsatisfactory experiments were made with one or two other kinds. It seems curious that no attempt was made with the Petersen form of label, which has been successfully employed in the Danish, English, and other investigations, and, in Dr. Schmidt's classic experiments at Iceland, continued to be returned with the fish more than three years after their liberation.

Mr. Farran's mode of tabulating his data has certain disadvantages. The usual method adopted in recording recaptures is to take them in chronological order. Had this plan been followed instead of taking the consecutive numbers of the labels (an arrangement which seems to have little to recommend it), reference and comparison with the experiments of other investigators would have been facilitated.

NOTES.

POLITICAL, municipal, industrial, and philanthropic activities are liberally represented in the list of Birthday Honours published on Tuesday, but science and other intellectual interests receive scant recognition. There are six new privy councillors, six new baronets, and thirty-two new knights in the list. Among the privy councillors is Sir Henry Roscoe, F.R.S., and among those who have received the honour of knighthood are Prof. W. A. Tilden, F.R.S., and Mr. E. H. Shackleton, the leader of the recent Antarctic expedition. Prof. A. H. Church, F.R.S., has been appointed a Knight Commander of the Royal Victorian Order (K.C.V.O.). Mr. T. L. Heath has been promoted to be Knight Commander of the Bath (K.C.B.), and Dr. Sven Hedin has been appointed an honorary Knight Commander of the Indian Empire (K.C.I.E.).

THE following is a list of fellows who have been recommended by the president and council of the Royal Society for election into the council for the ensuing year:—*President,* Sir Archibald Geikie, K.C.B.; *treasurer,* Mr. Alfred Bray Kempe; *secretaries,* Sir Joseph Larmor, Prof. J. R. Bradford; *foreign secretary,* Sir William Crookes; *other members of the council,* Dr. H. B. Baker, Dr. W. H. Gaskell, Prof. E. H. Griffiths, Prof. Horace Lamb, Prof. H. M. Macdonald, Major P. A. MacMahon, Dr. C. J. Martin, Sir Andrew Noble, Bart., K.C.B., Prof. W. H. Perkin, Prof. E. B. Poulton, Prof. J. H. Poynting, Lieut. Colonel David Prain, C.I.E., Prof. R. A. Sampson, Dr. A. E. Shipley, the Right Hon. Sir James Stirling, Dr. A. Strahan.

WE regret to see the announcement of the death of Dr. W. H. Dallinger, F.R.S., on Sunday, November 7, at sixty-seven years of age.

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[1] Department of Agriculture and Technical Instruction for Ireland. Fisheries Branch. Scientific Investigations, 1907, No. iii. "Plaice Marking Experiments on the East Coast of Ireland in 1905 and 1906." By G. P. Farran. Pp. 86+xxxiii plates. (Dublin, 1909.)

Sir George Darwin, K.C.B., F.R.S., has been elected an honorary member of the Calcutta Mathematical Society.

Dr. J. J. Dobbie, F.R.S., director of the Royal Scottish Museum, Edinburgh, has been appointed principal chemist of the Government laboratories in succession to Sir T. E. Thorpe, C.B., F.R.S., who has retired.

The date of the annual exhibition held by the Physical Society of London, which was fixed some time ago for December 10, has been altered to Tuesday, December 14, so that the exhibition may be open in the afternoon as well as in the evening.

A Reuter message from Berlin states that in the course of excavations conducted by the Museum of Silesian Antiquities at Ottitz, near Ratibor, a clay figure representing a nude female divinity was unearthed in a Stone-age dwelling. The figure is said to be the most ancient model of the human form in existence.

At the meeting of the Junior Institution of Engineers on Tuesday, November 16, the presidential address, on "The Propelling Machinery of Warships," will be delivered by Vice-Admiral Henry J. Oram, C.B., Engineer-in-Chief of the Fleet.

The opening meeting of the Illuminating Engineering Society will be held on Thursday, November 18, at the premises of the Royal Society of Arts, when the inaugural address will be delivered by Prof. Silvanus P. Thompson, F.R.S., the first president of the society.

Sir Arthur Rücker, F.R.S., and Prof. Arthur Schuster, F.R.S., both members of the board of advisers of the Department of Terrestrial Magnetism, Carnegie Institution of Washington, made official visits to the magnetic survey yacht *Carnegie* while at Falmouth, inspecting the instruments and methods of work.

A Reuter message from Washington states that the National Geographic Society has awarded its gold medal to Commander Peary. The subcommittee appointed to examine the explorer's records and proofs reported that they afford conclusive substantiation of his claim to have reached the North Pole, and this report was unanimously accepted by the board of managers. The society has passed a resolution referring to a subcommittee of experts the question whether any explorer reached the North Pole before 1909.

Sir William White, K.C.B., F.R.S., chairman of the council of the Royal Society of Arts, will open the new session of the society on November 17 with an address, the subject of which will be "An Imperial Navy." Before Christmas there will be four ordinary meetings of the society, at which papers will be read by Mr. T. Thorne-Baker, on "Phototelegraphy"; the Hon. R. C. Parsons, on "Resilient Wheels for Vehicles"; Mr. J. Buckland, on "The Destruction of Plumage Birds"; and Mr. H. Pearson, on "The Diamond Fields of Brazil." One meeting of the Indian section will be held, at which Sir James Wilson will read a paper on "The Punjab," and Mr. Samuel Simpson will treat "Agricultural Development in Nyasaland" at a meeting of the Colonial section. There will be one course of Cantor lectures; in them Mr. C. C. Turner will give a popular account of the progress which has been made in aëronautics.

The Hampstead Scientific Society inaugurated a new astronomical observatory and meteorological station on the southern margin of Hampstead Heath on Saturday. Mr. P. E. Vizard presided over a large meeting of the society in Heath Mount School, and short addresses were given on the value of the astronomical work which could be done by Dr. F. Womack, and on the meteorological work by Dr. H. R. Mill. Sir Samuel Wilks, F.R.S., referred to the efforts the society had made to secure this observatory, which has cost about 250*l.* The party then visited the observatory, which, by the kind permission of the Metropolitan Water Board, is placed on the top of the covered reservoir on the highest point of Hampstead, 450 feet above sea-level. The small astronomical observatory has a revolving dome, and contains an $8\frac{1}{2}$-inch equatorial reflector by Grubb, presented to the Society by Dr. Womack. A sidereal clock has been presented by Mr. E. Duveen, and it is hoped that a driving clock will be added later. The meteorological equipment consists of a barometer in the observatory, a Stevenson screen with the usual thermometers, a rain-gauge and a sunshine recorder, all of them exposed in an unexceptionable manner, so that the observations cannot fail to be of much value for climatological purposes. Interesting comparisons may be looked for between the Hampstead records and those taken only a few feet above sea-level in St. James's Park. In a district so subject as London is to partial visitations of fog and thunderstorms, the multiplication of trustworthy meteorological stations in representative positions is much to be desired.

Arrangements have been made for an International Congress of Radiology and Electricity at Brussels on September 6, 7, and 8, 1910, in connection with the exhibition to be held there. The congress will be held in three sections, and the subjects to be dealt with will include the following. In the first section, general questions of terminology and methods of measurement in radio-activity, and subjects connected with ions, electrons, and corpuscles will be dealt with. The second section will be divided into various subsections, dealing respectively with fundamental theories of electricity, study of radiations (including spectroscopy, chemical effects of radiations, and other allied questions), radio-activity, atomic theory, cosmical phenomena (including atmospheric electricity and atmospheric radio-activity). The third section will be biological, and will be devoted to consideration of the effects of radiations on living organisms. The sections will deal with purely biological questions as well as with the use of various radiations for medical purposes, both for diagnosis and therapeutics. In order to ensure the success of the congress, committees have been formed in the various countries which will take part in the congress, and the following men of science have already consented to act as presidents of the committee in each country:—Prof. Lenard (Germany), Prof. Exner (Austria), Prof. Oötvös (Hungary), Prof. Castillo (Spain), Prof. Barus (United States), Prof. Langevin (France), Prof. Rutherford (Great Britain), Prof. Blaserna (Italy), Prof. Birkeland (Norway), Prof. Lorentz (Holland), Prof. Ferreira da Silva (Portugal), Prof. Hurmuzescu (Roumania), Prof. Lebedew (Russia), Prof. Arrhenius (Sweden), and Prof. Guye (Switzerland). Communications regarding the congress should be addressed to Prof. Rutherford or Dr. W. Makower at the University of Manchester; or to Dr. W. Deane Butcher, Holyrood, Ealing, London, W., for matters connected with the biological and medical section. Intending members should communicate directly with the general secretary, Dr. J. Daniel, 1 rue de la Prévôté, Brussels.

Some of the friends and former pupils of the late Prof. Arthur Gamgee have thought that they could best mark their high appreciation of his great scientific attainments and single-hearted devotion to the prosecution of knowledge by forming a fund which should be of material benefit to his family—a widow and two daughters. Prof. Gamgee was widely known both in this country and abroad—he had, indeed, a European reputation—and it has seemed to those who have given their support to this fund, which was initiated some months ago, that it might be possible to augment still further the capital sum which it is desired should be raised if a knowledge of the objects of the fund was more widely spread, so that those who may wish to help should be invited to subscribe. It is not intended that any list of subscribers should be published. Towards the end of this month there will be a meeting of those who are in sympathy with the view that the raising of such a fund for his family would be the best and wisest appreciation of Prof. Gamgee's life-long devotion to science. The date and place of this meeting will be duly announced. Subscriptions may be sent to Prof. Arthur Schuster, Victoria Park, Manchester; Dr. A. D. Waller, Physiological Laboratory, University of London, S.W.; or Dr. G. A. Buckmaster, University College, London, W.C.

To the second half of the "Bergens Museum Aarbog" for 1909 Mr. Haakon Schetelig contributes an article on Norwegian antiquities received by the museum in 1908. The specimens include a roughly chipped stone implement from Vespestad; a bench of pine-wood from Hammer Church, Nordhordland; a portion of an iron sword, with silver mountings on the scabbard, from Sondhordland; a stone axe from Sogn; a flint javelin-head from Hardanger; and a bronze brooch from Lofoten.

In a paper published in vol. xxii., part i., of the Proceedings of the Royal Society of Victoria, Miss Morris and Miss Raff direct attention to certain features in the structure of the Australian lancelet, *Assymetron bassanum*, which have either escaped previous notice or have been inadequately described. The species in question occurs locally in depths up to 20 fathoms along the coasts of Victoria, and is commonly used in the laboratories of the colony in place of the typical Amphioxus. In another paper in the same issue Miss Buchanan commences a detailed account of the anatomy of Australian earthworms, dealing in this instance with the blood-vascular system, which is illustrated in the different species by diagrams.

In vol. xvii., No. 6, of the Proceedings of the Royal Physical Society of Edinburgh, Dr. Campbell Geddes directs attention to the extraordinary individual variation to be met with in the degree of development of the muscular impressions, crests, or tubercles of the appendicular skeleton of the human subject, and the inferences to be drawn therefrom. In the author's opinion such surface-details of the bones of the skeleton are only indirectly dependent on age, sex, and muscular activity, and are not, as Topinard believed, an index of the absolute muscularity of the individual. On the contrary, they depend directly upon, and therefore serve as an index to, the type of nutrition which the somatic cells of the individual enjoyed during life.

The origin and flora of the salt-marshes, salt-ponds, and fresh-water lakes of the northern coast of New Jersey have been studied by Mr. J. W. Harshberger, who gives the results of his investigations in the August issue of the Proceedings of the Academy of Sciences of Philadelphia. Such lakes and ponds are due to the advance of sand-dunes across the outlets of streams arising some distance inland. Most of the larger streams that have kept their outlets open are bordered for some distance from the sea with a characteristic salt-marsh vegetation. As the bars encroached on the outlets of the streams the water became brackish, and the salt-marsh plants gradually disappeared with the decrease of saltness. Finally, near the heads of several of the bays, as well as in some of the smaller ponds, the water becomes more and more fresh, and the salt-marsh plants are replaced by those accustomed to grow in or near fresh-water streams. Similarly, salt-ponds have become slowly changed into fresh-water lakes, with a corresponding alteration of the vegetation.

We have received the report on the progress and condition of the U.S. National Museum for the year ending June 30, 1908, in which detailed information is given as to the work accomplished on the new building up to that date, with illustrations of the complete structure. The progress of the work was considerably delayed owing to the failure of contractors to deliver the full complement of granite within a specified period. During the year under review the ethnological section of the museum was very largely augmented by collections illustrative of the natives of Borneo and the Philippines, the cliff-dwellers of Arizona, the Zuni Indians of New Mexico, and the Tahltau Indians of British Columbia. Mammals and birds from Malaya, the Philippines, and Costa Rica bulk largely among the additions to the zoological section, and the collections of fishes and invertebrates were largely augmented by the final distribution of the specimens obtained during the exploring cruise of the *Albatross* in the Pacific.

The nematodes come in for a large share of attention in the latest number of the *Zeitschrift für wissenschaftliche Zoologie* (Bd. 93, Heft iv.), in which Mr. E. Martini continues his studies on the subcuticula and lateral areas, and Dr. Fr. Bílek deals with the fibrillar structures in the muscle and intestinal cells of ascarids. Dr. Bílek's memoir, with its beautiful illustrations, constitutes a noteworthy addition to our knowledge of invertebrate cytology.

Messrs. Sanders and Co., Shaftesbury Avenue, have issued a very complete series of lantern-slides, 270 in all, illustrating spiders and their habits, a number of which we have had the opportunity of inspecting. The photographs were taken from nature by Mr. Richard Hancock, and show great manipulative and artistic skill. The series, of which a complete catalogue is also published, should be of great use to popular lecturers.

The *Journal of Morphology* for October (vol. xx., No. 3) contains two important cytological papers. In his "Observations on the Oökinesis in *Cerebratulus lacteus*," Naohide Yatsu describes the phenomena of maturation and fertilisation of the egg and its early cleavage stages. He deals especially with the behaviour of the "centriole," or, as English cytologists generally term it, the "centrosome," the latter term being used by the present author to designate the "centroplasm" which surrounds the "centriole," in other words, what is often termed in this country the "centrosphere." It is evident that the terminology of cytologists is in a somewhat confused state. Yatsu maintains the view that the middle piece of the spermatozoon carries a centriole into the egg at fertilisation, and that this gives rise by division to the cleavage centrioles.

Another paper in the *Journal of Morphology*—"Comparative Studies in Crustacean Spermatogenesis"—by M. Louise Nichols, besides the author's own observations, contains a useful *résumé* of the work of previous writers on the morphology of the crustacean spermatozoon. It seems that, according to Koltzoff, the curious immobile spermatozoon of the higher Crustacea is constructed very much on the principle of a cartridge. After the spermatozoon has become attached to the egg by means of its processes, the "capsule" explodes and drives the nucleus and centrosome into the egg. The same journal also includes an interesting account of the life-history and habits of *Chaetopterus variopedatus* by Mr. H. E. Enders, and a very full account of the development of the procephalic lobes of *Epeira cinerea* by Mr. A. E. Lambert, while Mr. Walter Meek contributes a description of the structure of the heart muscle of Limulus.

A PRELIMINARY revision of Philippine Myrtaceæ, by Dr. C. B. Robinson, published in the *Philippine Journal of Science* (Botany, vol. iv., part iii.), is primarily noteworthy for the number of species, just short of a hundred, described under the genus Eugenia. This is largely due to the incorporation under Eugenia of the segregates Jambosa and Syzygium, to which the greater number of species belong. Fully half the species are new types, and a considerable proportion of the remainder are endemic. Most of the Eugenias are trees yielding timber of value, although none supplies timber so commercially important as the myrtaceous tree *Xanthostemon verdugonianus*. Outside the genus Eugenia the family is poorly represented by a dozen species distributed over nine genera.

A NOTE on *Fomes lucidus*, one of the Polyporaceæ, contributed by Dr. E. J. Butler to the *Indian Forester* (September), deals with the probable parasitism of this fungus, as previously suggested by Dr. Raciborski. The author mentions a number of cases of fungal diseases, reported from different parts of India, on such different trees as Casuarinas, betel-palm, *Dalbergia Sissoo*, in which the source could not be definitely traced, but in all of which *Fomes lucidus* was found to be present; inoculation experiments are required to decide the question. In the same issue there are good illustrations of hills in the north Arcot division, Madras, showing the absence of tree growth in unprotected and protected but grazed areas as compared with the growth on a fully protected and partially planted area. For reproduction *Pterocarpus santalinus*, Red Sanders, proved to be better than *Terminalia tomentosa*, teak, or other species that were tried.

A FINE catalogue of plants, bulbs, and seeds has been issued by Messrs. Kelway and Son, of Langport, Somerset. The firm makes a special feature of hardy perennial plants, and their list of species in this section may be regarded as complete, but the catalogue is even more noteworthy in the selection of varieties offered under those plants that have been special objects of cultivation. The records of the Royal Horticultural and Royal Botanic Societies bear testimony to the splendid varieties of delphiniums, gaillardias, pyrethrums, and gladioli raised by Messrs. Kelway, and, above all, of pæonies, herbaceous, "imperial," and tree; the firm also raise their own forms of other favourites, such as zonal pelargoniums, hollyhocks, and phloxes. The catalogue cannot fail to arouse the enthusiasm of all garden-lovers; it is eminently practical in arrangement, description, and directions, is illustrated with choice photographic reproductions, and contains a few coloured plates taken in colour direct from the object.

AN account of the Peruvian National School of Agriculture is given in a new monthly publication entitled *Peru To-day*. The country possesses a rich soil and a climate enabling tropical products to be grown as well as those of the temperate zones. The coast is said to be well adapted to cotton raising; sugar and rice are also grown besides the ordinary cereal and other crops. A model vineyard has been started, and also an experimental sugarcane station.

WE have received from Messrs. Pearl and Surface a paper on selection index numbers and their use in breeding, in which the authors discuss the case, commonly arising in practice, where it is desired to improve two or more features at the same time. Each of the several characters shown by the plant or animal receives a certain value, positive or negative. The sum of these values for each individual constitutes its index number. Those individuals with highest index numbers are then selected and used for breeding.

IN a recent number of the *Journal of Economic Biology* Mr. Southern describes a new species of Rhabditis, *R. brassicae*, discovered in a turnip in an advanced state of decomposition. The nematode worms commonly known as "eel worms" are found in water, soil, and decaying organic matter, and are responsible for a certain amount of damage to plants. Some genera, such as Tylenchus, are provided with a spine, by means of which the epidermis of the plant can be pierced and its juices sucked. In Rhabditis, however, this piercing apparatus is absent, and the author kept large numbers of the worms on the surface of a turnip for a month without the epidermis being affected; but once a way in was found, the worms were enabled to feed on the juices by means of their powerful sucking pharynx.

CONSIDERABLE attention is devoted to the culture of maize by the Transvaal Agricultural Department, and an account of the varieties most suitable is given by Mr. Burtt-Davy in the *Transvaal Agriculture Journal*. Dent maize is best for the main crops, as it usually gives the best yields and is in greatest demand; flint maize, on the other hand, is more suitable for districts where the rainfall is limited. Of the different varieties of dent maize Hickory King is most promising for the export trade, as it is purchased by corn-flour manufacturers, distillers, and brewers; by producing a choice grade of this variety still more profitable results may be obtained. Yellow varieties are grown for stock-feeding purposes.

THE quarterly issue of the *Eugenics Review* for October maintains the standard of former parts. In addition to the usual editorial notes and reviews, there is a short contribution by the honorary president, Sir Francis Galton, on the effects of small and persistent influences in moulding public opinion, and special articles on various aspects of eugenics. The note by Dr. Havelock Ellis directing attention to the sterilisation, on social grounds, of four mentally defective persons in Switzerland, and the Rev. J. H. F. Peile's discussion of the relation of the Church to the eugenic movement—a pressing and difficult problem—are, perhaps, of most general interest. It is to be regretted that the article by Dr. Slaughter, on selection in marriage, should be open to the criticism of Mr. Peile that much of the literature of eugenics is unconciliatory and dogmatic in tone. The adoption of a polemical style is inappropriate in a scientific contribution to the discussion of the subject, and defeats its own end in an article written for propagandist purposes.

THE *Century Magazine* for November contains a popular article, by Prof. Metchnikoff, on the utility of lactic microbes in the diet, their mode of action, and an explanation of the author's views on longevity.

THE winter session of the London School of Tropical Medicine was opened on October 26 by Mr. Whitelaw

Reid, the American Ambassador, when Prof. Osler delivered a masterly address on the progress of tropical medicine and the benefits resulting therefrom. Prof. Osler urged the great need there is for further extension in research on diseases of the tropics.

CONSIDERABLE activity is being manifested in the attempt to cope with the plague of sleeping sickness in Africa. The Sleeping Sickness Bureau, under the direction of Dr. Bagshawe, has issued its tenth Bulletin, containing a summary of researches on trypanosome diseases, their pathology and treatment; also a progress report on the Uganda sleeping sickness camps from December, 1906, to November, 1908, compiled by Dr. Hodges, the principal medical officer, Uganda. The welcome statements are made that sleeping sickness is greatly on the decrease in Buganda kingdom, and that the drug atoxyl at least prolongs life, and in exceptional cases is curative. A bibliography of trypanosomiasis and tsetse-flies, embracing papers published prior to April, 1909, and compiled by Major C. A. Thimm, of the Sleeping Sickness Bureau, is in the press.

IN *Symons's Meteorological Magazine* for October, Mr. C. Harding gives an interesting note, with diagram, of the summer weather (April–September) experienced in London and the suburbs during the last fifty years, prepared from the records of the Greenwich Observatory. The average number of warm days, on which a temperature of 70° and above was reached, was seventy-four; the greatest number of warm days was 127, in 1865. The last ten years, with the exception of 1906, have been cool. The average rainfall for the summer season is 12·29 inches —an amount which was exceeded this year by 1·80 inches.

A NEW barograph for recording minute and rapid oscillations of atmospheric pressure, invented by Mr. T. Shida, is described in the Proceedings of the Tokio Physical Society for April last. By a simple plan an aneroid barometer is made to record photographically; for the purpose of magnification, Kelvin's bifilar method is applied directly to a Bourdon tube, as used by Darwin and others. To protect the instrument, the whole system is enclosed in an air-tight case, with the exception of a small window provided with a lens for photographic registration. The case and tube have each a short piece of metal tube with stop-cocks communicating with the atmosphere. Specimens of the records are appended to the paper; the period of oscillation at Tokio was generally about six seconds, vibrations with the period of twelve seconds being most conspicuous. The author thinks that such observations may eventually explain the true cause of the pulsation of the ground.

A COPY of "Studies in Practical Topography," by Mr. H. T. Crook, published by the Manchester Tactical Society, has reached us. Mr. Crook vigorously criticises the prepared sheets issued for some recent military examinations in a chapter entitled "The Land of (*d*)1," and gives three interesting topographical studies on Ruthin and the Clwydian range, Ilkley Skipton and the Pennines, and the Ribble Valley.

AN excellent example of detailed geographical study of a small area appears in a paper, published in the *Mitteilungen* of the Vienna Geographical Society (vol. lii., No. 9), on the town of Graz. The author, Dr. G. A. Lukas, discusses the position, soil, water supply, climate, flora and fauna, and population of Graz and its neighbourhood with much detail, and the paper is accompanied by a geological map by Dr. Franz Heritsch. Specially interesting is the examination of the relation of local and outside conditions, and of the historical events which finally gave Graz the predominance over the equally well-situated Wildon.

A NEW series of calculating tables, by Dr. J. Peters, is announced (Berlin: Georg Reimer). The tables are to contain the products of all numbers of four figures by the numbers 1 to 100, so to multiply together two numbers of four figures it is only necessary to take two partial products from the tables and add them together, *i.e.* the multiplication is performed in two lines, which are written down from the tables.

A PROJECT for the formation of a museum of aërial navigation has been started under the auspices of the authorities of the Frankfurt Exhibition, the Frankfurt Aëronautical Society, the Physical Society, and other bodies in Frankfurt. It is pointed out that aërial navigation has a small past and a great future, and that the recent exhibition affords an excellent nucleus for a collection which can never be complete unless it is founded in the early days of the subject.

IN view of the exaggerated importance attached to aëroplane record-breaking feats by the unscientific public, it is somewhat of a relief to turn to Mr. Gerald Biss's criticisms in the *Standard* of October 26. Great stress is laid on the power of individuality as a factor in present-day flights, it being pointed out that it was Mr. Latham's individuality which made his wonderful flight of the previous Friday possible. In a paragraph headed "When Aviation is Farcical," Mr. Biss says:—"The truth of the matter is, in a nutshell, that the progress of aviation has been greatly overwritten by ignorant enthusiasts and is still in the days of its earliest infancy. After the present boom, which will, I am sure, be far more short-lived than either the cycle or the motor boom, it will behove designers to sit down and work out the questions of automatic stability, vertical rising, compactness to the point of the practical, security against sudden dropping, and so on. . . ."

THE view generally held that in the liquefaction of gases in the Linde or Hampson apparatus the cooling is due to the Joule-Kelvin effect has been attacked by Pictet in a series of articles which have appeared in the technical Press during the last half-dozen years. He has put forward an expression for the cooling which makes it depend on the work the gas does in overcoming the pressure in front of the expansion valve, and implies that it increases with increase of initial temperature and is almost independent of the fall of pressure. Messrs. W. P. Bradley and C. F. Hale, of the Wesleyan University of Connecticut, have made an extensive series of experiments on the cooling of the air in a liquefying apparatus in widely differing circumstances of pressure and temperature, and have found that the facts are qualitatively in agreement with the original theory, although there are quantitative differences to be explained, while they are diametrically opposed to the Pictet theory. The memoir is contained in the September number of the *Physical Review*.

IN a paper entitled "The Elastic Breakdown of Nonferrous Metals," read at the recent Manchester meeting of the Institute of Metals, Prof. C. A. Smith, of the East London College, describes the special strain-measuring appliance called the sphingometer, devised and used by him for the tension, compression, and torsion strips. There were five conditions which the instrument was required to fulfil, namely, (1) to determine the maximum, as well as the mean stress, on the material tested; (2) to be easily adapted to specimens of varying diameters; (3) to be easily adapted to specimens of varying length; (4) to measure accurately strains of at least one hundred-thousandth part of an inch; (5) to be of reasonable expense. The results of a large number of tests made with the instrument are given. These tend to prove that copper, aluminium, and other non-ferrous metals have very varying elastic properties, and it is consequently impossible to establish any definite law for elastic failure. It appears, however, that elastic failure always does take place according to a law which approximates closely to the maximum shear-stress theory.

In an article on the development of modern road surfaces in the Journal of the Franklin Institute for October, Mr. W. H. Fulweiler divides the methods of applying tar into three general heads:—(*a*) Brushing with a hot coating of coal-tar and dusting it lightly with sand; in general use in France. (*b*) Painting the surface by machine and dusting with sand; in general use in England. (*c*) Coating the surface with a fairly heavy coating of hot tar or tar compounds, and then covering with a light coat of screening, the surface being finally rolled. The latter is the general system adopted in America, and seems to be better adapted to the rougher surface of American roads. A refined grade of tar, considerably heavier than that used in France or England, is used, having more body and greater binding properties, and the coating applied is about twice as heavy. A light coating of clean gravel or fine stone chips is then put on instead of sand and rolled, thus renewing the wearing surface and filling the voids better than can be done by the use of sand. The treatment produces deeper penetration and more lasting effect, and succeeds best on macadam roads. It is practically mud-proof, absolutely free from road dust, apparently proof against very heavy motor traffic, and is the most satisfactory for American conditions. The cost is higher than that of the French and English methods.

An interesting pamphlet dealing with water-hammer in steam pipes has been issued by Mr. C. E. Stromeyer, chief engineer of the Manchester Steam Users' Association. According to the Board of Trade reports, water-hammer has been the cause of about 120 steam-pipe explosions. Mr. Stromeyer finds that nearly one-half of these have been due to the absence of drain-cocks on steam pipes, or to their injudicious use. A large number, chiefly on steamers, have been produced by admitting steam into pipes containing water. Others have occurred when water was admitted into steam pipes, or when steam condensed in them. Steam being admitted through valves on which water was resting, injudicious opening of valves having steam and water on both sides, and injudicious manipulations of steam valves, whereby plugs of water have been set in motion, have all contributed to swell the total of explosions. Mr. Stromeyer considers it inadvisable to lay down at present definite rules for the design of pipe arrangements in general, having been led to this conclusion by the fact that draining arrangements, designed to obviate explosions, have caused the majority of accidents, and also because in many cases of complicated pipe arrangements the water-hammer may often be attributed to any of the above-mentioned causes. Mr. Stromeyer complains of the insufficiency of the official reports of explosions having given him much difficulty in arriving at definite conclusions.

Mr. W. B. Clive, of the University Tutorial Press, Ltd., has published a second edition of "First Stage Sound, Light and Heat." The book has been revised and rewritten by Dr. R. W. Stewart, who has introduced a course of experimental work. The price of the book is 2*s*.

In connection with the Winnipeg meeting of the British Association last August, the *Manitoba Free Press* published a series of illustrated biographical sketches of the president, Sir Joseph Thomson, F.R.S., the presidents of the sections, the evening lecturers, and the general officers of the association. These biographies have now been re-issued in pamphlet form at the price of 50 cents. Copies of the booklet can be obtained from Mr. A. V. Thomas, c/o *Manitoba Free Press*, Winnipeg, at 7½*d*. each.

We have received a copy of the second part of vol. xiii. of the Transactions of the Leicester Literary and Philosophical Society. The booklet contains abstracts of lectures delivered before the society, the report of the council, and the annual reports of the sections of the society presented at the annual general meeting in May. The report states that the balance of the fund raised in connection with the visit to Leicester, in 1907, of the British Association has been voted to the council of the society for investment as the nucleus of a fund, the interest accruing from which is to be devoted in a manner to be decided by the council, annually, or at such times as the council may determine, to the development of local scientific knowledge, including that bearing upon the industries of the town. A cheque for 80*l*. has been received, and the council has appointed a special committee to consider and report as to the best means of applying the money in furtherance of the object intended.

OUR ASTRONOMICAL COLUMN.

Astronomical Occurrences in November:—

Nov. 11. 10h. 27m. Mercury in conjunction with the Moon. (Mercury 1° 21′ S.).
16. 16h. 27m. Venus in conjunction with the Moon. (Venus 0° 6′ S.).
,, 19h. 0m. Vesta in conjunction with the Moon. (Vesta 1° 15′ N.).
17. 5h. 39m. Uranus in conjunction with the Moon. (Uranus 3° 0′ N.).
22. 10h. 11m. Mars in conjunction with the Moon. (Mars 4° 26′ N.).
23. 13h. 15m. Venus in conjunction with Uranus. (Venus 2° 33′ S.).
,, 14h. 53m. Saturn in conjunction with the Moon. (Saturn 1° 32′ N.).
,, 7h. 39m. Minimum of Algol (β Persei).
26. 20h. 55m. Eclipse of the Moon, partly visible at Greenwich.
,, 4h. 28m. Minimum of Algol.
29. 23h. 22m. Neptune in conjunction with the Moon. (Neptune 4° 14′ S.)

Re-discovery of Winnecke's Comet (1909*d*).—A telegram from the Kiel Centralstelle announces that Winnecke's comet was re-discovered at the La Plata Observatory, Argentina, on October 31. Its position on that date at 8h. 14·1m. (La Plata M.T.) was 17h. 11m. 51·6s., −27° 18′ 43″, and its magnitude was about 10·0; this position lies a little to the south-west of θ Ophiuchi. According to Prof. Hillebrand's elements, the perihelion passage took place on October 4·0 (G.M.T.).

Halley's Comet.—According to a note in the November number of the *Observatory*, Halley's comet is steadily increasing in brightness, and ten minutes' exposure, presumably with the Greenwich 30-inch reflector, gives a strong image. Reproductions of photographs are given in the *Observatory* (Greenwich, September 23), *Knowledge*, and the *Astrophysical Journal* (Yerkes Observatory, September 16, 17, 24, and 26). The *Observatory* (No. 415, p. 435) also gives an ephemeris for April and May, 1910, the time of perihelion passage being taken as April 19·65